DOCUMENT RESUME

ED 202 270 HE 013 737

AUTHOR Beck, Robert E.
TITLE Career Patterns: The Liberal Arts Major in Bell System Management.
INSTITUTION Association of American Colleges, Washington, D.C.
SPONS AGENCY Ford Foundation, New York, N.Y.
PUB DATE Mar 81
NOTE 19p.; Paper presented at a conference sponsored by the Association of American Colleges (March 4, 1981).
AVAILABLE FROM Association of American Colleges, 1818 R Street, NW, Washington, DC 20009 ($1.00).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Administrator Qualifications; *Business; *College Graduates; Communication Skills; Comparative Analysis; Employment Level; Higher Education; Interpersonal Competence; *Job Skills; Leadership Qualities; *Liberal Arts; Longitudinal Studies; Majors (Students); *Managerial Occupations; Mathematics; Sciences; Vocational Followup; Writing Skills
IDENTIFIERS *American Telephone and Telegraph Company

ABSTRACT

The potential and progress of liberal arts majors in management positions with the American Telephone and Telegraph Company were investigated in two studies. In the Management Progress Study, a total of 422 managers from six different operating companies were studied since their hiring in the mid-1950s. Of these, 274 were college graduates when employed. In 1977, a new project, the Management Continuity Study, was begun to examine differences and similarities between the new generation of college recruits and the last. The major method used to study the participants in both studies was the management assessment center, which has been the basis for determining potential for advancement. Assessment dimensions include the following: administrative skills, consisting of planning and organizing and decision-making; interpersonal skills, including such things as face-to-face leadership, oral communication skills; intellectual ability, including range of interests, general mental ability, and written communication skills; and managerial motivation, including need for advancement and financial motivation. The effect of educational level attained and college major in relation to these dimensions was analyzed. It was found that humanities and social science majors showed especially strong interpersonal skills and were similar to business majors in administrative skills and motivation for advancement. Their greatest weakness was in quantitative skills. The math and science majors were similar to the engineers in their strengths and weaknesses: they had strong quantitative skills but were weak in administrative and interpersonal skills and had rather low motivation for advancement. One overall conclusion is that there is no need for liberal arts majors to lack confidence in approaching business careers. (SW)

ED202270

CAREER PATTERNS

The Liberal Arts Major in Bell System Management

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Association of American Colleges

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Robert E. Beck

HE 013737

aac Association of American Colleges

Association of American Colleges

The Association of American Colleges is the only national organization whose concern is the encouragement, enhancement, and support of liberal learning at all of the nation's colleges and universities.

Since 1915, the Association has been committed to improving the quality of higher education and academic leadership on campuses throughout the country. Now, as the national association for liberal learning, AAC has begun a comprehensive program to emphasize liberal learning as the heart of higher education.

Because liberal learning establishes an essential foundation for further academic, personal, and professional growth, AAC is committed to offering services to its members which expand their capabilities for providing liberal learning to students of all ages and in all settings of higher education.

Project Quill

Project QUILL (Quality in Liberal Learning), AAC's direct grant program, provides seed money for curricular innovations to strengthen liberal education in all postsecondary settings. Originally funded by the Ford Foundation, Project QUILL now continues with the support of a combination of corporate and foundation sources to assist institutions as they develop programs to assure that career-oriented students receive adequate instruction in liberal learning. QUILL grants range from $1,000 to $10,000, with the average grant at $4,500. With the spread of new ideas generated by these grants, Project QUILL demonstrates that modest funding can turn a promising initiative into a nationally recognized model for improving higher education.

CAREER PATTERNS

The Liberal Arts Major in Bell System Management

by

Robert E. Beck

Assistant Vice-President - Human Resources
American Telephone and Telegraph Company

aac Association of American Colleges

Additional copies are available from AAC at $1.00 each (to cover postage and handling). All orders must be prepaid.

Association of American Colleges
1818 R Street, NW
Washington, DC 20009
202/387-3760

The speech reprinted here was presented on March 4, 1981 as part of a conference on "Quality in Liberal Learning - and How to Improve It." Sponsored by the Association of American Colleges, this conference was an assessment of the experience of Project QUILL, and brought together one hundred educators and directors of innovative programs supported by QUILL grants.

The information presented in this speech is based on longitudinal studies of the Basic Human Resources Research Group at AT&T, directed by Douglas W. Bray and Ann Howard.

The potential and progress of liberal arts majors in management has never been much of an issue in the Bell System. In fact, it took a special study to bring together the information presented here. It is not because the Bell System lacks research interests or capabilities that the data were previously unavailable; in fact, our professional staff probably does more research in human resources than any other company in the country. The reason for omitting research on college major is that we never thought it made that much difference in selecting future managers.

Diversity of academic preparation has been characteristic of Bell System managers for a long time. Among the top ten executives at AT&T, four are electrical engineers, two have degrees in business, and two in the social sciences. In addition, one has a Ph. D. in physical chemistry and one never attended college! Engineers traditionally have been well represented since the Bell System is a highly technical company, spurred by many innovations in the Bell Laboratories. But the company is also people-intensive. With nearly one million employees, it is important to be well endowed with managerial skills as well as technical skills.

At the present time our operating companies employ more than 6,000 college graduates a year. Of these more than one third are liberal arts graduates, including those with humanities, social science, math and scientific backgrounds. In addition, a wide variety of engineers and business majors as well as specialists such as computer programmers are also important as college recruits. There recently has been an upturn in the number of business majors hired, since we are attempting to increase our direct sales staff to meet the challenges of deregulation and competition.

New college graduates are typically hired into the first of seven levels of management in a Bell System operating company. The hope is that all of them will show enough promise to rise at least to the third level, which is the entry into middle management. Some, of course, will go much higher and eventually become the top executives of the corporation.

To answer the question of how different college majors compare in managerial potential and progress, a pool of long-standing research data was tapped by the Basic Human Resources Research group at AT&T. This group has been doing longitudinal studies of managers for the last 25 years. These studies are confidential, with no information reaching managers or supervisors to affect the careers of the individuals involved. The research is quite comprehensive, with a great variety of information and numerous follow-up points.

The first of these studies, the Management Progress Study (MPS), was begun in 1956. A total of 422 managers were selected from six different operating telephone companies to participate in the study. Of these, 274 were college graduates when employed. Reflecting the typical such hire in the late 1950s, all were white males. The participants were considered part of a general management pool who were expected to have a good chance to reach middle management in the years to come. These men are still being studied in middle age and mid-career, and present plans are to follow them into retirement.

In 1977 a new project, the Management Continuity Study (MCS), was begun. This study was designed to parallel the Management Progress Study as closely as possible to examine differences and similarities between the new generation of college recruits and the last. To date, 204 college graduates from thirteen operating companies have undergone the first phase of MCS. One half of these participants are females and one third are minorities, reflecting the race/sex mix of college graduate hires in the late 1970s.

The major method used to study the participants in both studies was the management assessment center. Originally developed at AT&T as a technique for studying the lives and careers of the participants in the Management Progress Study, it soon showed promise as a method for selecting managers for advancement. Its validity for that purpose was established by MPS when it became clear that the assessment staff had been able to identify with remarkable accuracy which participants would receive later promotions. As noted earlier, advancement was not influenced by the confidential research data. Assessment centers are now used company-wide on an operational basis to determine potential for advancement to positions from the first to the fifth levels. Over 250,000 people have been assessed in the Bell System to date, and the method has spread to hundreds of other companies, both nationally and internationally.

The assessment center method consists of several important elements. First are the dimensions or statements defining the behaviors and characteristics being measured. These are developed by job analyses of the positions for which the assessments are conducted. Examples of dimensions might be organizing and planning ability or leadership skills.

A second essential element of an assessment center is a set of exercises. Both individual and group techniques are used, including at least one simulation. Some typical individual exercises are interviews, aptitude tests, and questionnaires of motivations, personality, or attitudes. Group exercises may be business games or leaderless group discussions. A popular simulation is the In-Basket, in which candidates are faced with a fictional manager's letters, memos, telephone calls, and so forth and must decide how best to dispose of the various items.

Performance in the exercises is observed and evaluated by multiple assessors, the third essential ingredient in the method. The assessors receive up to three weeks of intensive, standardized training in how to conduct and evaluate performance in the exercises and write reports on what they have observed. The group of assessors come together for final integration sessions in which all the information on each candidate is read aloud and the assessors pool their judgments to rate the dimensions. Although managers are trained to be assessors in operational centers, the research assessment centers developed for MPS and MCS use a professional staff of psychologists, both AT&T's and outside academicians. Two of these outside assessors have served on the studies for 25 years!

Research with the Management Progress Study and other assessment centers has shown that there are several basic characteristics identified by assessment that

relate to later advancement into management. A primary characteristic is administrative skills, consisting of the dimensions Planning and Organizing and Decision Making. Interpersonal skills are equally important; these include such things as face-to-face leadership, oral communications skills, and making a forceful and likeable personal impact. Intellectual ability is also critical, and research has shown that both verbal and quantitative skills relate to success in an organization like the Bell System. Finally, motivation for advancement is a strong determinant of later progress; those who want to succeed are much more likely to do so. With these characteristics in mind, it is possible to explore the data from the basic research studies and relate them to college major.

Educational Level

First to be considered is the current crop of college graduates from the Management Continuity Study. Table 1 shows the distribution of the MCS sample by college major. As can be seen in the first two columns, 44 percent of them are liberal arts majors, distributed about equally between Humanities/Social Science and Math/Science. The participants in the longitudinal studies were to represent general management hires, so technical specialists such as computer programmers were generally not included.

TABLE 1

MANAGEMENT CONTINUITY STUDY UNDERGRADUATE MAJOR AND EDUCATIONAL LEVEL

	Total		Master's	
	N	%	N	%
Liberal Arts	90	44%	35	39%
Humanities	16	8%	9	56%
Social Science	30	15%	11	37%
Math	33	16%	10	30%
Science	11	5%	5	46%
Engineering	26	13%	2	8%
Business	76	37%	16	21%
Other	11	6%	3	27%
Total	**203**	**100%**	**56**	**28%**

The right hand columns of Table 1 indicate those within each major who had master's degrees. For the total sample, 28 percent had master's degrees, but these degree holders were not distributed equally across the various majors. Liberal arts majors were much more likely to have a master's degree (39 percent), especially when compared to the engineers (8 percent). Since whether or not a candidate had a master's degree did make a difference in the quality of that candidate, this would introduce a bias in the data on college majors if it were not taken into account.

Illustrations of the impact of the master's degree in the MCS data are shown in Tables 2 and 3. Both tables show differences in average ratings of assessment center dimensions between those with a bachelor's degree and those with a master's degree. The dimension ratings are made on a five-point scale, where "5" is always high. The asterisks in the tables show where average scores are different at a statistically significant level according to t-tests between the two groups.

Two categories of dimensions are shown in Table 2, administrative skills and interpersonal skills. Those with master's degrees scored higher on all the dimensions noted with asterisks, and the group differences just missed statistical significance on those without an asterisk. The largest differences were in the interpersonal areas of Leadership Skills and Perception of Threshold Social Cues,

TABLE 2

IMPACT OF MASTER'S DEGREE - I

Assessment Dimensions:	Average Rating (1 = low, 5 = high)		
	Bachelor's		Master's
Administrative Skills			
Organizing And Planning	2.8		3.1
Decision Making	2.5	*	2.9
Creativity	2.0	*	2.4
Interpersonal Skills			
Leadership Skills	2.6	**	3.1
Oral Communication Skills	2.9		3.2
Behavior Flexibility	2.7	*	3.0
Forcefulness	2.6	*	3.1
Social Objectivity	2.9	*	3.2
Perception of Threshold Social Cues	2.9	**	3.3
N	147		56

*Group differences significant at $p<.05$ **$p<.005$

or social sensitivity. Interpersonal dimensions showing somewhat less significant results were Forcefulness, Behavior Flexibility, which indicates ability to modify behavior to achieve a goal, and Social Objectivity, which means freedom from prejudices. On administrative skills, those with more education made more appropriate and timely decisions on exercises like the In-Basket and were more creative in their approaches to management problems.

The master's degree was not as clearly an indication of superiority in the areas shown in Table 3, intellectual ability and managerial motivation. Although the better educated had broader interests, they were not more capable intellectually. Those with master's degrees scored no higher than those with bachelor's degrees on mental ability tests, nor were various examples of their writing skills any more impressive.

In two areas of motivation, having a master's degree had little impact. One of these is reflected in the dimension Primacy of Work, meaning the extent to which work is one of the most important things in life. Neither were there significant differences on Inner Work Standards, defined as having one's own high standards for work, regardless of external requirements. Where the master's graduates did show heightened motivation was toward extrinsic rewards; the better educated recruits were more interested in both advancement and money. Perhaps this is a major reason they went on for a master's degree in the first place.

TABLE 3

IMPACT OF MASTER'S DEGREE - II

Assessment Dimensions:	Average Rating 1 = low, 5 = high		
	Bachelor's		Master's
Intellectual Ability			
Range of Interests	2.8	**	3.2
General Mental Ability	3.1		3.0
Written Communication Skills	3.1		3.0
Managerial Motivation			
Primacy of Work	3.0		3.1
Inner work Standards	3.2		3.3
Need for Advancement	2.9	**	3.6
Financial Motivation	2.9	**	3.5
N	147		56

**Group differences significant at $p<.005$

In summary, those with master's degrees showed superior performance on administrative and interpersonal skills and had higher motivation to advance in the company. However, they were not more intellectually capable than those with bachelor's degrees. The impact of the additional degree prevailed regardless of undergraduate major or whether the master's was an M.A., an M.S., or an M.B.A.

Impact of College Major

Because of the differences related to the master's degree, it is necessary to separate the influence of level of education from analyses of the impact of college major. In the four tables of MCS data that follow, this has been accomplished by analysis of covariance techniques, and the scores presented have been adjusted for level of education. These charts compare four groups by major, the first two comprising liberal arts: Humanities/Social Science, Math/Science, Engineering, and Business. Those categorized as Other, which included education majors and a few specialized degrees, have been excluded, so the total sample size in these comparisons is 192.

Table 4 contrasts the four major groups on administrative skills. For all three dimensions, Organizing and Planning, Decision Making, and Creativity in solving management problems, the group differences were statistically significant. A comparison of the average assessment ratings shows that the non-technical majors (Humanities/Social Science and Business) were superior in administrative skills to the technical majors (Math/Science and Engineering).

The differences in interpersonal skills by major were even more pronounced, as shown in Table 5. On all three dimensions, Leadership Skills, Oral Communication Skills, and Forcefulness of personal impact, the humanities and social science majors were clearly ahead. Weakest were the engineers and the math and science majors. Evidence from a sample of exercises to support the dimension ratings are also shown in Table 5. The scores for the group exercise ratings use five-point scales with "5" a high score; two assessors concurred on these ratings within one point. Oral presentation was based on a five to ten minute talk given by each assessee on an assigned topic. In the competitive discussion that followed the oral presentations, assessees in groups of six had to compete for funds for their assigned cause. Assessor ratings on these group exercises indicated the humanities and social science majors turned in the best performance. They also had the best leadership skills in a group discussion (not shown in the table) that was free from assigned competitive roles and simply left resolution of the problem to the group members.

Some reasons why the humanities and social science majors were more apt to turn in a better performance in interpersonal tasks were illustrated in personality questionnaires. Three personality questionnaires were administered in MCS: the California Psychological Inventory (CPI), the Guilford-Zimmerman (G-Z) and the Edwards Personal Preference Schedule (EPPS). The humanities and social

TABLE 4

ADMINISTRATIVE SKILLS

AVERAGE RATING
(1 = low, 5 =high)

	Liberal Arts			
	Humanities/ Social Science	Math/ Science	Engineering	Business
Assessment Dimensions				
*Organizing And Planning	2.9	2.7	2.4	3.1
*Decision Making	2.8	2.3	2.3	2.9
*Creativity	2.5	1.9	1.8	2.3
N	46	44	26	76

*Group differences statistically significant at $p<.05$
Adjusted for level of education

TABLE 5

INTERPERSONAL SKILLS

Average Score
(1 = low, 5 =high)

	Liberal Arts			
	Humanities/ Social Science	Math/ Science	Engineering	Business
ASSESSMENT DIMENSIONS				
**Leadership Skills	3.1	2.3	2.4	2.7
**Oral Communication Skills	3.4	2.9	2.5	2.9
**Forcefulness	3.2	2.3	2 3	2.8
GROUP EXERCISE RATINGS				
*Oral Presentation	3.4	2.9	2.7	3.1
*Competitive Discussion	3.3	2.6	2.7	3.1
PERSONALITY QUESTIONNAIRES[a]				
**Dominance (CPI)	56%ile	34%ile	38%ile	50%ile
**Ascendance (G-Z)	78%ile	48%ile	55%ile	67%ile

[a]Bell System College Graduate Norms, 1978

*Group differences statistically significant at $p<.05$, **$p<.005$.
Adjusted for level of education

science majors described themselves as more socially dominant on several of these scales, such as the CPI Dominance and G-Z Ascendance scales shown in Table 5. In addition, there were significant group differences, with the humanities and social science majors the high scorers on the EPPS Dominance scale, measuring liking to assume leadership roles, the CPI's Social Presence scale, measuring a manipulative type of sociability, and the CPI's Self Acceptance scale, measuring sense of personal worth.

In contrast, the engineers and math and science majors tended to score lowest on the social dominance scales. The engineers described themselves as a conservative group who did not want to stand out in a crowd. They scored lowest on the EPPS Exhibition scale (liking to attract attention), lowest on Change (enjoying doing new and different things), and highest on Endurance (liking to persist at a job). On the CPI they scored highest on measures of conservative conformity, such as Socialization (having internalized social values), Self-Control (showing restraint of impulsivity and irrationality), and Communality (conventionality). Thus the humanities and social science majors had self-concepts which promoted standing out from the crowd as leaders, while the engineers were more apt to define themselves as consistent background workers.

Table 6 shows the differences among the college major groups with respect to intellectual ability. Here it is important to attend to what is not significant as well as what is. Noticeably *not* significantly different among the majors were verbal skills. The non-technical majors did no better than technical when it came to performance on a verbal ability test (from the School and College Ability Test or SCAT) or on ratings of written communications skills. The greatest difference in intellectual ability occured in quantitative skills. The math and science majors and engineers were clearly superior to the others, but the humanities and social science majors scored particularly low, at the 17th percentile. For managerial positions requiring quantitative analyses, this must be considered a particular disadvantage. The humanities and social science majors and engineers did have somewhat broader interests than the other two groups. Scores on the General Information Test of a range of knowledge reflected this trend, although the group differences were not statistically significant.

When managerial motivation was considered, differences by major appeared only for certain kinds of motivation. There was no impact of college major for Primacy of Work, Inner Work Standards, or Financial Motivation (see Table 7). Rather, the motivational differences by major were concentrated in the need for advancement. On ratings of the dimensions the humanities and social sciewnce and business majors were equally high on Need for Advancement and equally low on Ability to Delay Gratification of a promotion, while the technical majors scored in the opposite direction.

A questionnaire measure of need for advancement pointed to the business majors as being highest in these interests, although the group differences with the analysis of covariance was not quite statistically significant ($p < .06$). Group differences on projective measures of need for achievement and advancement were significant, however, with the business majors clearly the highest scorers. These

TABLE 6

INTELLECTUAL ABILITY

	Average Score (1 = low, 5 = high)			
	Liberal Arts			
	Humanities/ Social Science	Math/ Science	Engineering	Business
ASSESSMENT DIMENSIONS				
*Range of Interests	3.2	2.7	3.1	2.8
General Mental Ability	3.0	3.2	3.2	3.0
Written Communication Skills	3.2	3.3	3.0	2.9
ABILITY TESTS				
General Information Test[a]	63%ile	54%ile	61%ile	52%ile
SCAT-Verbal[b]	60%ile	47%ile	47%ile	48%ile
**SCAT-Quantitative[b]	17%ile	50%ile	56%ile	35%ile
N	46	44	26	76

[a]Bell System College Graduate Norms, 1978, N=589; [b]1958, N=585

*Group differences statistically significant at $p<.05$, **$p<.005$. Adjusted for level of education

projectives ratings were made on a five-point scale and based on responses to two incomplete sentences tests and six stories written to Thematic Apperception Test pictures. These exercises attempt to reveal underlying motivations that are less subject to the various distortions that can affect questionnaires. By these measures, the business majors seemed most anxious to get ahead, although the assessor ratings of dimensions assigned equally high advancement motivation to the humanities and social science majors.

Results After 20 Years (the MPS Study)

The MCS results have shown the present relationships between college major and managerial potential. A consideratioin of the Management Progress Study results can indicate the relative stability of these findings and also point to relationships of college major with later progress in the Bell System. Table 8 shows the distribution of college recruits of more than 20 years ago who were MPS participants. Of the total sample of 274 college graduates, 38 percent were liberal arts majors, only slightly fewer than in MCS. However, their distribution among the

TABLE 7

MANAGERIAL MOTIVATION

	Average Score (1 = low, 5 = high)			
	Liberal Arts			
	Humanities/ Social Science	Math/ Science	Engineering	Business
ASSESSMENT DIMENSIONS				
Primacy of Work	3.0	2.9	2.8	3.3
Inner Work Standards	3.1	3.2	3.2	3.3
* Need for Advancement	3.3	2.8	2.8	3.3
* Ability to Delay Gratification	3.2	3.7	3.6	3.2
Financial Motivation	3.1	3.0	2.8	3.3
PAPER/PENCIL TESTS OF MOTIVES				
Advancement (Questionnaire)[a]	49%ile	44%ile	38%ile	60%ile
Money (Questionnaire)[a]	46%ile	54%ile	50%ile	62%ile
**Achievement/Advancement (Projective Ratings)[b]	3.0	2.8	3.1	3.5

[a]MCS - Norms

[b]5 - Point Rating Scale

*Group difference significant at $p<.05$, **$p<.005$.
Adjusted for level of education

technical and non-technical majors was heavily weighted to the humanities and social science majors. In fact, it was not possible to perform reliable analyses with the math and science majors since there were so few of them (18).

Table 9 gives a summary of the original assessment center findings with the MPS participants by college major groups. Results are presented by each major category that relates to managerial success. In the table an H stands for high scorer among the groups by major and an L for low scorers. Results for corresponding dimensions and tests showed statistically significant differences among the groups using analysis of variance techniques. Since almost none of the MPS participants had a master's degree, this effect did not have to be controlled.

The humanities and social science majors turned in the best overall performance. They were high scorers on all but one category, but there they revealed the same weakness shown in the MCS results: quantitative skills. Their scores on the SCAT quantitative scale was only at the 23rd percentile of the same Bell System norms shown previously (Table 6).

TABLE 8

MANAGEMENT PROGRESS STUDY UNDERGRADUATE MAJOR

	N	%
Liberal Arts	105	38%
Humanities	27	10%
Social Science	60	22%
Math	4	1%
Science	14	5%
Engineering	68	25%
Business	96	35%
Other	5	2%
Total	274	100%

TABLE 9

MPS ASSESSMENT RESULTS AND COLLEGE MAJOR

HIGH (H) AND LOW (L) SCORERS

	Humanities/ Social Science	Engineering	Business
Administrative Skills	H	L	
Interpersonal Skills	H	L	H
Intellectual Ability			
Verbal	H	L	L
Quantitative	L	H	L
Advancement Motivation	H	L	H
Have Middle Management Potential	46%	26%	31%
N	87	68	96

The engineers had a pattern of strengths and weaknesses directly opposite to those of the humanities and social science majors. They were the highest scorers on quantitative ability but weak on all the other managerial skills. Thus both the humanities and social science majors and the engineers have shown a consistent pattern of strengths and weaknesses that held over a twenty year period of time in the two longitudinal studies.

The business majors in MPS did not perform quite as well as those of MCS. Although again they showed strengths in interpersonal skills and motivation to advance in management, their intellectual ability was not up to that of the more recent business majors. This may be due to higher standards in business schools today.

On overall ratings of potential for middle management, made by the assessors after reaching consensus on the ratings of the dimensions, there were highly significant group differences. *Nearly half (46 percent) of the humanities and social science majors were considered to have potential for middle management, compared to only 31 percent of the business majors and 26 percent of the engineers.*

College major was also examined for the Management Progress Study in relation to various criteria for management success. These results are presented in Table 10. The first line of the table shows the number of years to achieve an initial promotion into the second level of management. The group difference was highly significant, with the engineers taking about 1 1/2 years longer to be promoted than the humanities and social science and business majors. By the end of the eight years, the average management level of the humanities and social science majors was highest, with the engineers still trailing well behind. By year 20, the same trends were evident, but the differences were no longer statistically signifi-

TABLE 10
PROGRESS IN MANAGEMENT BY MAJOR

AVERAGE

	Humanities/ Social Science	Engineering	Business
**Years To Reach 2nd Level	4.0	5.4	3.9
N	57	47	68
**Level At 8 Years	2.6	2.2	2.4
N	48	46	60
Level At 20 Years	3.4	3.2	3.2
N	43	40	47
% 4th Level or Higher, Year. 20	43%	23%	32%
N	43	40	47

**Group differences statistically significant at $p<.005$

cant. In terms of average management level achieved, the engineers made the greatest gains between years 8 and 20, so that the humanities and social science majors were only slightly ahead at the end of this time.

Another way to view the 20 year data is to consider the proportion of men who had achieved at least the fourth level, a midway point in the management hierarchy and usually considered a sign of considerable success. Among humanities and social science majors 43 percent had achieved at least the fourth level, compared to only 32 percent of the business majors and 23 percent of the engineers. This group difference is not quite statistically significant. Thus in the long run, the early advantages of the humanities and social science majors were somewhat but not completely overcome.

Summary

To recapitulate the findings on liberal arts majors, the humanities and social science majors showed especially strong interpersonal skills and were similar to business majors in administrative skills and motivation for advancement. Their greatest weakness was in quantitative skills. The relative quality of their other managerial skills was reflected in their progress in the Bell System, especially during the early years. The math and science majors were similar to the engineers in their strengths and weaknesses. They had strong quantitative skills but were weak in administrative and interpersonal skills and had rather low motivation for advancement.

One overall conclusion from these data is that there is no need for liberal arts majors to lack confidence in approaching business careers. The humanities and social science majors in particular continue to make a strong showing in managerial skills and have experienced considerable business success. We hope and expect this to continue.